

Use of microarray techniques to probe interactions between organic molecules and mineral surfaces

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Interactions between organic molecules and mineral surfaces are important in many scientific and technological applications and may be relevant to the origin of life. A large number of interactions are possible between the thousands of organic molecules and mineral surfaces observed on Earth. In order to address this large number of molecule-surface combinations, we employed an automated microarray technique to print organic molecules onto mineral surfaces. Several amino acids (L and D forms) were printed onto the uneven surfaces of right and left-handed quartz (100) using a Telechem Spotbot quill-type microarrayer. Small volumes (0.7 nL per spot) of fluorescent-labeled amino acid were deposited at up to 20 different dilutions in quintuplicate. The surfaces were then washed with saline solution and scanned for fluorescence to test if preferential molecular binding occurred post-wash. Protocols were developed for scanning irregular-shaped crystals using a Genepix 4000B scanner. Results showed significant and quantifiable preferential retention of L lysine on right-handed quartz (100) compared to that of left-handed quartz (100). CONCLUSION: Microarray techniques allow high throughput analysis of interactions between crystal surfaces and organic molecules and promises to be a useful technique for investigations in surface science and prebiotic chemistry.

